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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/669,616	09/24/2003	Brian Miller	F101	5615
25784	7590	06/15/2005		EXAMINER
MICHAEL O. SCHEINBERG				VERSTEEG, STEVEN H
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AUSTIN, TX 78716-4140			ART UNIT	PAPER NUMBER
			1753	

DATE MAILED: 06/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/669,616	MILLER, BRIAN
	Examiner	Art Unit
	Steven H. VerSteege	1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

1)  Responsive to communication(s) filed on 24 September 2003.

2a)  This action is **FINAL**.                            2b)  This action is non-final.

3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## **Disposition of Claims**

4)  Claim(s) 1-22 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5)  Claim(s) \_\_\_\_\_ is/are allowed.

6)  Claim(s) 1-22 is/are rejected.

7)  Claim(s) \_\_\_\_\_ is/are objected to.

8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

9)  The specification is objected to by the Examiner.

10)  The drawing(s) filed on 24 September 2003 is/are: a)  accepted or b)  objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All b)  Some \* c)  None of:  
1.  Certified copies of the priority documents have been received.  
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)  Notice of References Cited (PTO-892)  
2)  Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3)  Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 9/16/04

4)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_ .

5)  Notice of Informal Patent Application (PTO-152)

6)  Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Drawings***

1. Figures 1A and 1B should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "301" has been used to designate both "host computer" [1032] and "stage" [1027]. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 309 [1026] &

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[1031]; **354** [1031] & [1032]; **356** [1031]; **358** [1032]; and **402** [1040]. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: **401** (see Figure 4). Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 4, 5, 12, and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by US 2003/0138709 A1 to Burbank et al. (Burbank).

7. For claim 4, Applicant requires a method for removing a material covering an alignment mark on a substrate comprising directing a charged particle beam at the material covering an alignment mark and removing the material by charged particle beam sputtering without using an etch assisting gas. For claim 5, the charged particle beam is a focused ion beam.

8. Burbank discloses recovering alignment marks obscured by a layer (abstract) by directing a focused ion beam at the material and removing the material by sputter etching [0025].

9. For claim 12, Applicant requires the substrate to be a silicon wafer. Burbank uses a silicon dioxide substrate and hence, has a substrate that comprises silicon [0030].

10. For claim 13, Applicant requires the material covering the alignment mark to be a metal film. The material covering the alignment marks is a metal film [0028].

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 14, 15, and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2001/0027917 A1 to Ferranti et al. (Ferranti).

13. For claim 14, Applicant requires an apparatus for removing a material covering an alignment mark on a substrate comprising a device for loading the substrate; a device for aligning the substrate; a device for positioned the substrate; a charged particle beam system having a charged particle source for emitting a charged particle beam, an optical system for focusing the charged particle beam, and a computer controlled beam deflector to position the charged particle beam; a device for controlling the charged particle beam dose applied to the material; and a device for unloading the substrate.

14. In my interpretation of claim 14, the limitation “for removing a material covering an alignment mark on a substrate” is an intended use and does not provide any patentable weight to the claim. Ferranti discloses an apparatus used to repair defects in lithography masks (abstract; Figure 1) comprising an x-y stage for positioning and aligning the substrate; a focused ion beam that mills the substrate (abstract); a computer controlled beam deflector **20**; power supply that controls the beam dose **34**; and chamber door through which the substrate is loaded and unloaded **60**.

15. While there is no explicit disclosure of a device that loads and unloads the substrate, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide some generic device for removing and inserting the substrate because of the desire to

process the substrate (i.e. insert it into the chamber) and then use the substrate (i.e. remove the substrate).

16. For claim 15, Applicant requires the charged beam system to be a focused ion beam system. Ferranti uses a focused ion beam system (abstract).

17. For claim 18, Applicant requires the charged particle beam to be directed at an oblique angle relative to the surface of the substrate. The deflectors direct the beam at an oblique angle (Figure 1).

18. For claim 19, Applicant requires the beam to be directed at an angle of 40-80 degrees relative to the substrate normal. Ferranti deflects the beam based upon the pattern of the mask to be repaired [0020]. Thus, the deflection, and hence, angle relative to the substrate surface normal, is dependent upon the pattern and is a result effective variable.

19. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a deflection angle of between 40 and 80 degrees because it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

*In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

20. For claim 20, Applicant requires the charged particle beam to have a beam current of 300-20,000 nanoamps. For claim 21, Applicant requires the beam current to be 1500 to 5000 nanoamps. Ferranti discloses the beam to be a 1-60 keV ion beam [0020]. A beam current within Applicant's claimed range would be obvious using Ferranti's power requirements.

21. For claim 22, Applicant requires an optical microscope. Ferranti uses a scanning electron microscope [0021].

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22. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2001/0027917 A1 to Ferranti et al. (Ferranti) in view of US 6,440,615 B1 to Shimizu.

23. For claim 16, Applicant requires the charged particle beam system to be a noble gas ion beam system. For claim 17, Applicant requires the charged particle beam system to be selected from the group consisting of Ar ion beam, Kr ion beam, and Xe ion beam.

24. Ferranti is described above. Ferranti does not disclose using a noble gas ion beam system. Ferranti uses a metal ion beam of gallium, but other plasma ion sources can be used [0021]. Ferranti is repairing masks (abstract).

25. Shimizu is repairing masks (abstract) with a focused ion beam (col. 8, l. 28-33) and thus is analogous art with Ferranti. Shimizu discloses that focused ion beam system repairing masks can use gallium, argon, silicon, or the like ion beams with the only difference being the sputtering rate (col. 8, l. 33-34). Thus, gallium and argon are art recognized equivalents.

26. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Ferranti to utilize an argon ion beam because of the knowledge that an argon ion beam is an art recognized equivalent to a gallium ion beam and because of the desire to repair at a different sputtering rate.

27. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0138709 A1 to Burbank et al. (Burbank) in view of US 6,440,615 B1 to Shimizu.

28. For claim 6, Applicant requires the focused ion beam to be of noble gas ions. For claim 7, Applicant requires the focused ion beam to be an argon or krypton or xenon ion beam.

29. Burbank is described above, but does not disclose the material of the ion beam. Thus, Burbank could utilize any conventional ion beam known in the art of focused ion beam sputter etching.

30. Shimizu uses a focused ion beam to sputter etch material from a substrate and hence, is analogous art. Shimizu uses an argon ion beam as noted above.

31. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Burbank to utilize an argon ion beam as the focused ion beam because of the knowledge that argon ion beams are conventional in the art of focused ion beam sputter etching.

32. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0138709 A1 to Burbank et al. (Burbank) in view of US 2001/0027917 A1 to Ferranti et al. (Ferranti) and US 6,440,615 B1 to Shimizu.

33. For claim 1, Applicant requires a method for removing a material covering an alignment mark on a substrate comprising mounting the substrate onto a stage in a focused ion beam system having a non-liquid metal ion source; directing an ion beam at the material covering an alignment mark with the beam having a current greater than 300 nanoamps and directed at an angle oblique relative to the surface of the substrate and removing the material by ion beam sputtering.

34. Burbank discloses the method for removing material covering the alignment mark as noted above, but does not disclose the details of the focused ion beam. Thus, any conventional ion beam system would be obvious.

35. As noted above, Ferranti discloses a focused ion beam system for removing material.

Shimizu also discloses a focused ion beam system for removing material. Thus, Burbank, Ferranti, and Shimizu are analogous art.

36. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize an argon ion beam in the focused ion beam system because gallium and argon ion beams are art recognized equivalents.

37. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Burbank to utilize the focused ion beam system of Ferranti because of the knowledge that it is a conventional focused ion beam system. By using Ferranti's system, the beam would be oblique and have an energy current as claimed by Applicant.

38. For claim 2, Applicant requires the focused ion beam system to have a plasma ion source. Argon is a plasma ion source.

39. For claim 3, Applicant requires the angle to be less than 80 degrees relative to the substrate normal surface. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a deflection angle of between 40 and 80 degrees because it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

40. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0138709 A1 to Burbank et al. (Burbank) in view of US 2001/0027917 A1 to Ferranti et al. (Ferranti).

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41. For claim 8, Applicant requires the beam to be directed at an angle relative to the surface of the substrate. For claim 9, the angle is 40-80 degrees. For claim 10, the beam current is 300-20000 nanoamps. For claim 11, the current is 1500-5000 nanoamps.

42. Burbank and Ferranti are described above. Ferranti does not disclose the beam to be at an angle or the beam current.

43. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Burbank to utilize the focused ion beam system of Ferranti because of the knowledge that it is a conventional focused ion beam system. By using Ferranti's system, the beam would be oblique and have an energy current as claimed by Applicant.

#### ***General Information***

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (571) 272-1700.

For inquiries involving Recovery of lost papers & cases; sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Denis Boyd at (571) 272-0992.

For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (571) 272-1300.

#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. VerSteeg whose telephone number is (571) 272-1348. The examiner can normally be reached on Mon - Thurs (6:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Steven H VerSteeg  
Primary Examiner  
Art Unit 1753

shv  
June 10, 2005